**3GPP TSG-SA WG6 Meeting #62 S6-243244**

**Maastricht, Netherlands, 19th – 23rd August 2024 (revision of S6-243xxx)**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **4** | **CR** |  | **rev** | **-** | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Target UE location provided by surrounding UEs |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | SA6 |
|  |  |
| ***Work item code:*** | eLSAPP |  | ***Date:*** | 2024-07-30 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | This CR enhanced location info subscription procedure, as concluded in 23.700-72 (KI#3, sol#1), with additional target UE location provided by its surrounding UEs. |
|  |  |
| ***Summary of change:*** | The Location info subscription procedure is enhanced to support the enhancement. |
|  |  |
| ***Consequences if not approved:*** | Missing support for new feature/function. |
|  |  |
| ***Clauses affected:*** | 9.3.4, 9.3.7, 9.3.8, 9.3.2.5, 9.3.2.7, 9.3.2.3, 29.5.27, 9.5.2.8, 9.3.2.x (new), 9.3.2.y (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **N** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **N** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **N** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* First Change \* \* \* \*

### 9.3.4 On-demand location reporting procedure

The location management server can request UE location information at any time by sending a location information request to the location management client, which may trigger location management client to immediately send the location report.



Figure 9.3.4-1: On-demand location information reporting procedure

1. Based on configurations such as periodical location information timer, or location information request from other entities (e.g., another location management client, VAL server), location management server initiates the immediately request location information from the location management client.

2. The location management server sends a location information request to the location management client.

3. If the target VAL UE ID or user ID is not equal to its own identity, the LM client triggers off-network location management procedures as described in clause 9.5 to obtain target VAL UE location; otherwise, VAL user or VAL UE is notified and asked about the permission to share its location. VAL user can accept or deny the request

4. The location management client immediately responds to the location management server with a report containing location information identified by the location management server and available to the location management client.

5. Upon receiving the report, the location management server updates location of the reporting location management client. If the location management server does not have location information of the reporting location management client before, then just stores the reporting location information for that location management client.

\* \* \* Next Change \* \* \* \*

### 9.3.7 Location information subscription procedure

Figure 9.3.7-1 illustrates the high level procedure of location information subscription request. The same procedure can be applied for location management client and other entities that would like to subscribe to VAL user or VAL UE location information. This procedure is also used for initiating tracking a UE's location. The procedure considers target UE location information provided by its surrounding UEs, the procedure can improve location accuracy and can be used also for target UE temporarily out of 3GPP radio coverage. LM client 1 is used as example in the figure as target UE that the VAL server is interested to know its location information.



Figure 9.3.7-1: Location information subscription request procedure

1. The VAL server sends a location information subscription request to the location management server to subscribe location information of one or more VAL users or VAL UEs. The request may include an indication for supplementary location information and the location QoS which contains the location accuracy, response Time and QoS class as defined in clause 4.1b of TS 23.273 [50]. In addition, the VAL server may request velocity information of the VAL UEs/Users in step 1.

2. The location management server shall check if the VAL server is authorized to initiate the location information subscription request and may retrieve the available and proper location access type and positioning methods (e.g. as described in TS 23.273 [50] and TS 29.572 [51]) for the target VAL UE based on the received location QoS. Further, the location management server may initiate location reporting configuration optionally including the retrieved location access type and positioning methods with the location management client of the UE for immediate reporting.

3. The location management server may optionally subscribe for UE location information from 3GPP core network for the UE. If the indication for supplementary location information is included in step 1, then UE location information is obtained from the 3GPP core network and/or the 3rd party location management server.

NOTE 1: How the location management server obtains the UE location from the 3rd party location management server is out of scope of this specification.

4. The location management server determines the UE location information of the UE as received in steps 2 and 3 and checks if it meets the location QoS requirements (if any) or not.

5. The LM server may optionally request the UE location from its surrounding UEs (as described in step 5 to 9). The LM server decides how to retrieve surrounding UEs which may be based on LM client 1 registered positioning method in location service registration. If the LM server decides to use UE-assisted surrounding UE retrieval, step 6 is executed; otherwise, NW-assisted surrounding UE retrieval is used as described in step 7.

6. The LM server requests the LM client 1 with an optional surrounding UE retrieval method (e.g. ProSe, BT, WiFi) to provide its surrounding UEs and the LM client 1 responds the LM server with VAL UE/User ID of discovered UEs as described in clause 9.3.x;

NOTE 2: For ProSe capable UE, the User Info ID defined in 3GPP TS 23.586 [TS23586] can represent VAL user ID. For Bluetooth capable UE, the Bluetooth MAC address can represent VAL UE ID. For WiFi Direct capable UE, the WiFi MAC address can represent VAL UE ID.

7a. The LM server derives an appropriate location area (where UE to UE communication is possible) internally using the location information of UE 1 (determined in step 4) as reference location. If the UE 1 location is last known UE location, the LM server uses UE mobility analytics service from 3GPP CN to derive UE location estimation for UE 1.

7b. The LM server uses 3GPP CN service (NEF service of Number of UEs present in a geographical area) to obtain all UEs within the derived location area in step 6.

8. The LM server selects a set of UEs (LM client 2..n) from UEs obtained in step 5 or step 7 based on registered location service information (e.g. positioning method) from LM client 2..n. Then LM server sends location request to LM client 2..n using On-demand location reporting procedure (as defined in clause 9.3.4) to obtain UE 1 location including an optional UE positioning method (e.g. PC5 SEAL LM, BT, WiFi) to be used to retrieve location. For LM client 2..n, if the UE positioning method is PC5 SEAL LM, UE 1 location information (including velocity) is obtained via off-network procedure as defined in clause 9.5; if the UE positioning method is non-3GPP (e.g. WiFi, BT), UE 1 location information (including velocity) is obtained via the corresponding non-3GPP method in LM client 2..n.

NOTE 3: The LM server can, based on local policy, select an UE without LM registration and trigger location request to the UE. If so, the request can be ignored by the UE (e.g., if SEAL LM-UU service is not supported) or the UE can reject the request (if the required positioning method is not supported).

9. The LM server takes the location information of UE 1 reported by LM client 2..n into consideration to calibrate UE 1 location determined in step 4.

NOTE 4: It is assumed that different location information collected over different positioning method may have differences in accuracy. How LM server processes calibration is implementation specific.

10. The location management server replies with a location information subscription response indicating the subscription status and if immediate reporting was requested, the location information of the VAL UE(s).

NOTE 5: The VAL server can use obtained UE location and velocity in application specific ways (e.g. traffic monitoring in V2X).

### 9.3.8 Event-trigger location information notification procedure

Figure 9.3.8-1 illustrates the high level procedure of event-trigger usage of location information. The same procedure can be applied for location management client and other entities that would like to subscribe to location information of VAL user or VAL UE. This procedure is also used for obtaining latest UE's location for tracking purpose.



Figure 9.3.8-1: Event-trigger usage of location information procedure

1. The location management server receives the latest location information of the UE as per the location report procedure described in clause 9.3.3.3.

2. The location management server may optionally receive the location information of the UE from 3GPP core and/or the 3rd party location management server network. If the indication for supplementary location information is included in the subscription, then UE location information is obtained from the 3GPP core network and/or the 3rd party location management server.

3. Based on the configurations, e.g., subscription, periodical location information timer, location management server is triggered to report the latest user location information to VAL server. The location management server determines the location information of UE as received in steps 1 and 2, including the supplementary location information (if indicated). The Location management server may report the location to the VAL server considering the location information received via non-3GPP positioning technologies (e.g. GNSS, Bluetooth), for instance, to improve the location accuracy.

4. Same as step 5-9 of Figure 9.3.7-1.

4. The location management server sends the location information report including the latest location information of one or more VAL users or VAL UEs to the VAL server or to the location management client that has previously configured. In addition, velocity of the requested VAL UEs may be included as part of the location information report.

5. VAL server may further share this location information to a group or to another VAL user or VAL UE.

NOTE: For other entities, the step 5 can be skipped if not needed.

\* \* \* Next Change \* \* \* \*

### 9.3.x Surrounding UEs retrieval procedure

Figure 9.3.x-1 illustrates the procedure of surrounding UE(s) retrieval. The LM server can use this procedure to know how many UE(s) are close to the requested UE hosting the LM client.



Figure 9.3.x-1: Surrounding UE(s) retrieval procedure

1. The LM server decides to Surrounding UE retrieval request to the LM client. The request may include surrounding UE retrieval method.

2. The LM client obtains UE(s) close to itself. The LM client considers the surrounding UE retrieval method (if received) during the obtaining procedure.

3. The LM client sends its surrounding UE(s) to the LM server in Surrouding UE retrieval response.

\* \* \* Next Change \* \* \* \*

#### 9.3.2.5 Location information subscription request

Table 9.3.2.5-1 describes the information flow from the VAL server or location management client to the location management server for location information subscription request or for updating an existing location information subscription.

Table 9.3.2.5-1: Location information subscription request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Identity | M | Identity of the requesting VAL server/VAL user or VAL UE (see NOTE 3) |
| Identities list | M | List of VAL users or VAL UEs whose location information is requested. |
| VAL service ID | O | Identity of the VAL service for which the location information is subscribed. |
| Time between consecutive reports | M | It indicates the interval time between consecutive reports |
| Supplementary location information indication | O | Indicates that supplementary location information is required. |
| Location QoS | O(NOTE 2). | Definition of the location Quality of Service for which the location information is requested (see NOTE 1). |
| Velocity indication | O | It indicates whether velocity of the requested VAL users/UEs is needed. |
| NOTE 1: The definition of location QoS has been defined in clause 4.1b of TS 23.273 [50] and the clause 6.1.6.2.13 of TS 29.572 [51].NOTE 2: The element is only applicable for the information flow from the VAL server to the location management server.NOTE 3: This information element shall not be updated via location information subscription update procedure in clause 9.3.2.7a. |

\* \* \* Next Change \* \* \* \*

#### 9.3.2.7 Location information notification

Table 9.3.2.7-1 describes the information flow from the location management server to the VAL server or the location management client.

Table 9.3.2.7-1: Location information notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Identities list | M | List of the VAL users or VAL UEs whose location information needs to be notified |
| Identity (see NOTE 2) | O | Identity of the VAL user or VAL UE subscribed to location of another VAL user or VAL UE (see NOTE 1) |
| Subscription ID (see NOTE 2) | O | Subscription identity related to VAL server subscription with Location management server for location information notification. |
| Triggering event | M | Identity of the event that triggered the sending of the notification |
| Location Information | M | Location information |
| Velocity information | O | Velocity information |
| Timestamp | O | Timestamp of the location report |
| NOTE 1: This is only used for location management server sends location information notification to the VAL user or VAL UE who has subscribed the location.NOTE 2: Either Identity or Subscription ID shall be included. |

\* \* \* Next Change \* \* \* \*

#### 9.3.2.3 Location information request

Table 9.3.2.3-1 describes the information flow from the VAL server to the location management server and/or from the location management server to the location management client for requesting an immediate location information report.

Table 9.3.2.3-1: Location information request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Identity list | M | List of VAL users or VAL UEs whose location information is requested |
| VAL service ID | O | Identity of the VAL service for which the location information is requested. |
| Requested location information | O | Identifies what location information is requested |
| Requested location access type(NOTE 4) | O(NOTE 1) | Identifies the location access type for which the location information is requested, e.g. as described in TS 23.273[50] and TS 29.572[51]. |
| Requested positioning method | O(NOTE 1) | Identifies the positioning method for which the location information is requested, e.g. as described in TS 23.273[50] and TS 29.572[51].If the requested VAL user/UE is not the receiving VAL user/UE hosting the LM client, the UE positioning method includes PC5 SEAL LM, BT, WiFi. |
| Location QoS | O(NOTE 3) | Definition of the location Quality of Service for which the location information is requested (see NOTE 2). |
| NOTE 1: This e element is only applicable for request sent from the LM server to the LM client.NOTE 2: The definition of location QoS has been defined in clause 4.1b of TS 23.273 [50] and the clause 6.1.6.2.13 of TS 29.572 [51].NOTE 3: The element is only applicable for the information flow from the VAL server to the location management server.NOTE 4: The non-3GPP access as defined in TS 23.273[50] and TS 29.572[51] is out of scope of the present specification. |

Editor's Note: It's FFS the security aspects for LM-Uu and LM-S in relation to the VAL service ID that need to be coordinated with SA3.

\* \* \* Next Change \* \* \* \*

#### 9.5.2.7 Off-network location request

Table 9.5.2.7-1 describes the information flow from the location management client-1 to the location management client-2 for the off-network location request.

Table 9.5.2.7-1: Off-network location request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Identity | M | Identity of the VAL user to which the location request is targeted or identity of the VAL UE. |
| Requested location information | M | Identifies what location information is requested |
| Velocity indication | O | It indicates whether velocity of the requested VAL users/UEs is needed. |

#### 9.5.2.8 Off-network location response

Table 9.5.2.8-1 describes the information flow from the location management client-2 to the location management client-1 for the off-network location response. The Off-network location response acts as an acknowledgement to the location management client-1.

Table 9.5.2.8-1: Off-network location response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | Indicates the success or failure for the operation |
| Location Information | M | Location information shared by VAL client e.g. retrieved from non-3GPP source |
| Velocity information | O | Velocity information |

\* \* \* Next Change \* \* \* \*

#### 9.3.2.x Surrounding UE retrieval request

Table 9.3.2.x-1 describes the information flow from the LM server to the LM client for obtaining surrounding UE information.

Table 9.3.2.x-1: Surrounding UE retrieval request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Identity | M | Identity of the requested VAL user or VAL UE |
| Surrounding UE retrieval method | O | Identify how to retrieve surrounding UE(s), e.g. ProSe, BT, WiFi |

#### 9.3.2.y Surrounding UE retrieval response

Table 9.3.2.y-1 describes the information flow from the LM client to the LM server for sending the surrounding UE information.

Table 9.3.2.y-1: Surrounding UE retrieval response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Result | M | Indicates the success or failure result.  |
| Identity list | O | List of VAL users or VAL UEs whose location is close to the requested VAL user or VAL UE.Applicable only for the success result. |

\* \* \* Next Change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.104: "Service requirements for cyber-physical control applications in vertical domains".

[3] 3GPP TS 23.379: "Functional architecture and information flows to support Mission Critical Push To Talk (MCPTT); Stage 2".

[4] 3GPP TS 23.280: "Common functional architecture to support mission critical services; Stage 2".

[5] 3GPP TS 23.281: "Functional architecture and information flows to support Mission Critical Video (MCVideo); Stage 2".

[6] 3GPP TS 23.282: "Functional architecture and information flows to support Mission Critical Data (MCData); Stage 2".

[7] 3GPP TS 23.286: "Application layer support for V2X services; Functional architecture and information flows".

[8] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[9] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[10] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[11] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[12] 3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".

[13] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[14] 3GPP TS 23.002: "Network Architecture".

[15] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[16] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE\_LTE); Stage 2".

[17] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[18] 3GPP TS 23.203: "Policy and charging control architecture".

[19] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[20] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

[21] 3GPP TS 29.214: "Policy and charging control over Rx reference point".

[22] 3GPP TS 29.468: "Group Communication System Enablers for LTE (GCSE\_LTE); MB2 Reference Point; Stage 3".

[23] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[24] IETF RFC 6733 (October 2012): "Diameter Base Protocol".

[25] ETSI TS 102 894-2 (V1.2.1): "Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionaryMultimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[26] ETSI TS 102 965 (V1.4.1): "Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration".

[27] ISO TS 17419: "Intelligent Transport Systems - Cooperative systems - Classification and management of ITS applications in a global context".

[28] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[29] 3GPP TS 33.434: "Service Enabler Architecture Layer (SEAL); Security aspects for Verticals".

[30] 3GPP TS 29.549: "Service Enabler Architecture Layer for Verticals (SEAL); Application Programming Interface (API) specification; Stage3".

[31] 3GPP TS 23.285: "Architecture enhancements for V2X services".

[32] IETF RFC 7252: "The Constrained Application Protocol (CoAP)".

[33] IETF RFC 8323: "CoAP (Constrained Application Protocol) over TCP, TLS, and WebSockets".

[34] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[35] IEEE Std 802.1Qcc-2018: "Standard for Local and metropolitan area networks - Bridges and Bridged Networks - Amendment: Stream Reservation Protocol (SRP) Enhancements and Performance Improvements".

[36] IEEE 802.1Q-2018: "IEEE Standard for Local and Metropolitan Area Networks—Bridges and Bridged Networks".

[37] IEEE Std 802.1CB-2017: "Frame Replication and Elimination for Reliability".

[38] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[39] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2".

[40] 3GPP TS 23.435: "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service".

[41] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[42] 3GPP TS 28.533: "Management and orchestration; Architecture framework".

[43] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[44] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[45] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[46] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[47] 3GPP TS 28.104: "Management and orchestration; Management Data Analytics".

[48] 3GPP TS 23.433: "Service Enabler Architecture Layer for Verticals (SEAL); Data Delivery enabler for vertical applications".

[49] 3GPP TS 23.436: "Procedures for Application Data Analytics Enablement Service".

[50] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2"

[51] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3"

[52] 3GPP TS 23.256 "Support of Uncrewed Aerial Systems (UAS) connectivity, identification and tracking; Stage 2".

[53] 3GPP TS 37.355: "LTE Positioning Protocol (LPP)".

[54] 3GPP TS 29.122: "T8 reference point for Northbound APIs".

[55] 3GPP TS 23.545 "Application layer support for Factories of the Future (FF)".

[TS23586] 3GPP TS 23.586: "Architectural Enhancements to support Ranging based services and Sidelink Positioning".

\* \* \* End of Changes \* \* \* \*